

**ENTERED**  
see page 6



PCT10

## RAW SEQUENCE LISTING

DATE: 05/22/2002

PATENT APPLICATION: US/10/018,290A

TIME: 13:47:32

Input Set : A:\DAVI149SEQLIST.TXT

Output Set: N:\CRF3\05222002\J018290A.raw

C:\CRF3\05222002\J018290A.raw

```

4 <110> APPLICANT: Hasse, Detlef
5   Panaccio, Michael
6   Sinistaj, Meri
8 <120> TITLE OF INVENTION: LAWSONIA DERIVED GENE AND RELATED OMPH
9   POLYPEPTIDES, PEPTIDES, AND PROTEINS AND THEIR USES
12 <130> FILE REFERENCE: DAVI149.001APC
14 <140> CURRENT APPLICATION NUMBER: US 10/018,290A
15 <141> CURRENT FILING DATE: 2002-04-16
17 <150> PRIOR APPLICATION NUMBER: PCT/AU00/00438
18 <151> PRIOR FILING DATE: 2000-05-11
20 <150> PRIOR APPLICATION NUMBER: US 60/133,986
21 <151> PRIOR FILING DATE: 1999-05-13
23 <160> NUMBER OF SEQ ID NOS: 13
25 <170> SOFTWARE: FastSEQ for Windows Version 4.0
27 <210> SEQ ID NO: 1
28 <211> LENGTH: 186
29 <212> TYPE: PRT
30 <213> ORGANISM: Lawsonia intracellularis
32 <400> SEQUENCE: 1
33 Met Lys Val Lys Thr Leu Ser Met Ala Ile Leu Ala Cys Leu Leu Val
34   1               5               10               15
35 Ala Asn Ser Ala Phe Ser Ala Asp Phe Pro Ile Gly Val Phe Asn Ser
36   20               25               30
37 Gln Ser Ile Ala Met Glu Ser Glu Ala Ala Lys Ala Ala Gln Lys Lys
38   35               40               45
39 Leu Gln Ser Glu Phe Gly Asn Glu Lys Thr Gln Leu Glu Lys Gln Ala
40   50               55               60
41 Lys Asp Leu Gln Thr Lys Ala Asp Asp Leu Gln Ala Lys Ser Ala Ala
42 65               70               75               80
43 Met Ser Asn Gln Ala Arg Glu Asp Lys Gln Arg Glu Phe Leu Glu Leu
44   85               90               95
45 Arg Arg Asn Phe Glu Glu Lys Ser Arg Asp Phe Ala Ile Arg Val Glu
46 100             105             110
47 Gln Ala Glu Thr Leu Arg Gln Tyr Leu Ala Glu Gln Ile Tyr Leu
48 115             120             125
49 Ala Ala Glu Thr Ile Ala Lys Lys Lys Gly Leu Lys Leu Val Leu Asp
50 130             135             140
51 Ser Ala Ser Gly Ser Val Met Tyr Leu Glu Lys Asn Leu Asp Ile Thr
52 145             150             155             160
53 Lys Glu Ile Leu Glu Ala Ile Asn Ala Ala Trp Lys Lys Gly Gly Ser
54 165             170             175
55 Lys Leu Pro Glu Met Ala Asn Arg Lys Lys
56 180             185

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```

59 <210> SEQ ID NO: 2
60 <211> LENGTH: 561
61 <212> TYPE: DNA
62 <213> ORGANISM: Lawsonia intracellularis
64 <220> FEATURE:
65 <221> NAME/KEY: CDS
66 <222> LOCATION: (1)...(561)
68 <400> SEQUENCE: 2
69 atg aaa gta aaa act ctt tcc atg gct att tta gct tgt tta tta gta 48
70 Met Lys Val Lys Thr Leu Ser Met Ala Ile Leu Ala Cys Leu Leu Val
71 1 5 10 15
73 gct aac agt gca ttt tcg gct gac ttc cct att ggt gtc ttt aat tct 96
74 Ala Asn Ser Ala Phe Ser Ala Asp Phe Pro Ile Gly Val Phe Asn Ser
75 20 25 30
77 caa tcc att gcc atg gag agt gaa gca gct aag gcc gct caa aaa aaa 144
78 Gln Ser Ile Ala Met Glu Ser Glu Ala Ala Lys Ala Ala Gln Lys Lys
79 35 40 45
81 tta caa tca gaa ttt ggt aat gaa aaa aca caa ctt gaa aaa caa gca 192
82 Leu Gln Ser Glu Phe Gly Asn Glu Lys Thr Gln Leu Glu Lys Gln Ala
83 50 55 60
85 aaa gat ttg caa aca aaa gct gat gat tta caa gct aag tca gca gct 240
86 Lys Asp Leu Gln Thr Lys Ala Asp Asp Leu Gln Ala Lys Ser Ala Ala
87 65 70 75 80
89 atg tct aac caa gca cgt gaa gat aaa caa aga gaa ttt ctt gaa ctt 288
90 Met Ser Asn Gln Ala Arg Glu Asp Lys Gln Arg Glu Phe Leu Glu Leu
91 85 90 95
93 cgt cgt aat ttc gaa gaa aaa tct cgt gac ttt gca ata cgt gtc gaa 336
94 Arg Arg Asn Phe Glu Glu Lys Ser Arg Asp Phe Ala Ile Arg Val Glu
95 100 105 110
97 caa gct gaa aac aca tta cgt caa tat cta gct gaa caa atc tat ctt 384
98 Gln Ala Glu Asn Thr Leu Arg Gln Tyr Leu Ala Glu Gln Ile Tyr Leu
99 115 120 125
101 gct gct gaa act ata gca aaa aag aaa ggg tta aaa ctt gtt ctt gat 432
102 Ala Ala Glu Thr Ile Ala Lys Lys Lys Gly Leu Lys Leu Val Leu Asp
103 130 135 140
105 agt gct agt gga agt gta atg tac ctt gaa aaa aat cta gat att aca 480
106 Ser Ala Ser Gly Ser Val Met Tyr Leu Glu Lys Asn Leu Asp Ile Thr
107 145 150 155 160
109 aaa gaa att ctt gaa gcc ata aat gct gca tgg aaa aaa ggt gga agt 528
110 Lys Glu Ile Leu Glu Ala Ile Asn Ala Ala Trp Lys Lys Gly Gly Ser
111 165 170 175
113 aaa ctt cca gag atg gca aac cgg aaa aaa taa 561
114 Lys Leu Pro Glu Met Ala Asn Arg Lys Lys *
115 180 185
118 <210> SEQ ID NO: 3
119 <211> LENGTH: 23
120 <212> TYPE: DNA
121 <213> ORGANISM: Artificial Sequence
123 <220> FEATURE:

```

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```

124 <223> OTHER INFORMATION: oligonucleotide primer RA176 forward
126 <400> SEQUENCE: 3
127 ttatttcatt cagaaggagc ttc                                     23
129 <210> SEQ ID NO: 4
130 <211> LENGTH: 21
131 <212> TYPE: DNA
132 <213> ORGANISM: Artificial Sequence
134 <220> FEATURE:
135 <223> OTHER INFORMATION: oligonucleotide primer RA177 reverse
137 <400> SEQUENCE: 4
138 aagtttagca atttctgaaa g                                       21
140 <210> SEQ ID NO: 5
141 <211> LENGTH: 143
142 <212> TYPE: PRT
143 <213> ORGANISM: Yersinia pseudotuberculosis
145 <400> SEQUENCE: 5
146 Ser Ser Ile Phe Gln Gln Leu Pro Ala Arg Glu Ala Val Ala Ala Gly
147 1 5 10 15
148 Lys Lys Gln Leu Glu Asn Glu Phe Lys Gly Arg Ala Thr Glu Leu Gln
149 20 25 30
150 Gly Ile Ala Ile Val Asn Val Met Glu Arg Asp Leu Gln Thr Lys Met
151 35 40 45
152 Gln Lys Leu Gln Arg Asp Gly Ser Thr Met Lys Ala Ser Asp Arg Thr
153 50 55 60
154 Lys Ile Leu Ser Arg Ile Gln Asp Ala Val Lys Ser Val Ala Thr Leu
155 65 70 75 80
156 Glu Asn Glu Val Met Lys Gln Arg Glu Thr Lys Gly Gly Tyr Asp Val
157 85 90 95
158 Val Ile Asp Ala Asn Ala Val Ala Tyr Ala Asp Ser Ser Phe Ser Thr
159 100 105 110
160 Lys Ala Gln Ala Phe Glu Gln Asp Asn Arg Arg Arg Gln Ala Glu Glu
161 115 120 125
162 Arg Asn Lys Lys Asp Ile Thr Ala Asp Val Leu Lys Gln Val Lys
163 130 135 140
166 <210> SEQ ID NO: 6
167 <211> LENGTH: 164
168 <212> TYPE: PRT
169 <213> ORGANISM: Yersinia enterocolitica
171 <400> SEQUENCE: 6
172 Met Lys Lys Ser Ser Ile Phe Gln Gln Leu Pro Ala Arg Glu Thr Val
173 1 5 10 15
174 Ala Trp Leu Cys Ala Ala Ser Leu Gly Leu Ala Leu Ala Ala Ser Ala
175 20 25 30
176 Arg Val Gln Ala Ala Lys Ile Lys Gln Leu Glu Asn Glu Phe Lys Gly
177 35 40 45
178 Arg Ala Thr Glu Leu Gln Gly Ala Ile Val Asn Val Met Glu Arg Asp
179 50 55 60
180 Leu Gln Thr Lys Met Gln Lys Leu Gln Arg Asp Gly Ser Thr Met Lys
181 65 70 75 80

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Input Set : A:\DAVI149SEQLIST.TXT

Output Set: N:\CRF3\05222002\J018290A.raw

```

182 Ala Ser Asp Arg Thr Lys Ile Leu Ser Arg Ile Gln Asp Ala Val Lys
183                               85                               90                               95
184 Ser Val Ala Ser Leu Glu Asn Asp Val Met Lys Gln Arg Glu Thr Lys
185                               100                              105                              110
186 Gly Gly Tyr Asp Val Val Ile Asp Ala Asn Ala Val Ala Tyr Ala Asp
187                               115                              120                              125
188 Pro Ser Phe Ser Thr Lys Ala Gln Ala Phe Glu Gln Asp Asn Arg Arg
189                               130                              135                              140
190 Arg Gln Met Glu Glu Arg Asn Lys Lys Asp Ile Thr Ala Asp Val Leu
191 145                               150                              155                              160
192 Lys Gln Val Lys
196 <210> SEQ ID NO: 7
197 <211> LENGTH: 197
198 <212> TYPE: PRT
199 <213> ORGANISM: Haemophilus influenzae
201 <400> SEQUENCE: 7
202 Met Lys Asn Ile Gly Tyr Ile Phe Gln His His Pro Asp Arg Gln Ala
203 1                               5                               10                               15
204 Val Ala Ala Lys Val Thr Ala Leu Ala Leu Gly Ile Ala Leu Ala Ser
205                               20                               25                               30
206 Gly Tyr Ala Ser Ala Glu Glu Lys Asp Lys Leu Asp Ala Glu Phe Lys
207                               35                               40                               45
208 Pro Val Ala Glu Lys Leu Ala Ala Ser Lys Ile Ala Phe Ile Asn Ala
209                               50                               55                               60
210 Lys Glu Val Asp Asp Lys Ile Ala Ala Ala Arg Lys Lys Val Glu Ala
211 65                               70                               75                               80
212 Lys Val Ala Ala Leu Glu Lys Asp Ala Pro Arg Leu Arg Gln Ala Asp
213                               85                               90                               95
214 Ile Gln Lys Leu Leu Asp Ser Ile Gln Thr Ala Thr Asn Asn Leu Ala
215                               100                              105                              110
216 Lys Arg Gln Gln Glu Ile Asn Lys Leu Gly Ala Ala Glu Asp Ala Glu
217                               115                              120                              125
218 Leu Gln Lys Leu Met Gln Glu Ala Lys Gly Tyr Thr Tyr Val Leu Asp
219                               130                              135                              140
220 Ala Asn Ser Ile Val Phe Ala Val Glu Gly Leu Arg Lys Leu Gln Val
221 145                               150                              155                              160
222 Glu Ala Gln Ser Lys Leu Ser Arg Lys Lys Ala Glu Leu Glu Lys Met
223                               165                              170                              175
224 Lys Asp Ile Thr Glu Glu Val Leu Lys Ser Ile Pro Ala Ser Glu Lys
225                               180                              185                              190
226 Ala Gln Glu Lys Lys
227                               195
230 <210> SEQ ID NO: 8
231 <211> LENGTH: 162
232 <212> TYPE: PRT
233 <213> ORGANISM: Aquifex aeolicus
235 <400> SEQUENCE: 8
236 Met Glu Gly Asn Lys Val Ile Arg Glu Ser Lys Phe Ile Ala Lys Ala
237 1                               5                               10                               15

```

## RAW SEQUENCE LISTING

DATE: 05/22/2002

PATENT APPLICATION: US/10/018,290A

TIME: 13:47:33

Input Set : A:\DAVII49SEQLIST.TXT

Output Set: N:\CRF3\05222002\J018290A.raw

```

238 Gln Ile Met Lys Lys Phe Phe Ala Leu Met Thr Leu Ile Ala Gly Ile
239          20          25          30
240 Ser Phe Ser Leu Asp Thr Glu Leu Arg Lys Glu Leu Glu Lys Tyr Gln
241          35          40          45
242 Lys Leu Ile Gln Glu Phe Ala Cys Val Asp Thr Lys Gln Lys Lys Leu
243          50          55          60
244 Glu Ala Leu Lys Lys Ser Leu Glu Ser Lys Ala Leu Ser Glu Lys Ala
245          65          70          75          80
246 Lys Glu Lys Val Phe Asp Lys Val Ile Lys Ile Val Glu Ser Thr Ala
247          85          90          95
248 Lys Lys Ala Lys Glu Ile Glu Gln Leu Glu Asp Glu Lys Lys Lys Ile
249          100          105          110
250 Lys Ala Val Phe Asp Cys Asn Ser Met Leu Tyr Trp Asp Lys Lys Leu
251          115          120          125
252 Arg Lys Leu Gln Val Glu Ala Gln Ser Lys Leu Ser Arg Lys Lys Ala
253          130          135          140
254 Glu Leu Glu Lys Met Ile Asp Ile Thr Asn Glu Val Leu Lys Glu Leu
255          145          150          155          160
256 Asp Lys

```

260 &lt;210&gt; SEQ ID NO: 9

261 &lt;211&gt; LENGTH: 161

262 &lt;212&gt; TYPE: PRT

263 &lt;213&gt; ORGANISM: Escherichia coli

265 &lt;400&gt; SEQUENCE: 9

```

266 Met Lys Lys Gly Ser Leu Phe Gln Gln Val Ala Gln Lys Thr Gly Val
267 1          5          10          15
268 Ser Trp Leu Leu Ala Ala Gly Leu Gly Leu Ala Leu Ala Thr Ser Ala
269          20          25          30
270 Gln Ala Ala Asp Lys Ile Asn Thr Leu Glu Asn Glu Phe Lys Gly Arg
271          35          40          45
272 Ala Ser Glu Leu Gln Arg Ala Ile Val Asn Met Met Glu Thr Asp Leu
273          50          55          60
274 Gln Ala Lys Met Lys Lys Leu Gln Ser Met Lys Ala Gly Ser Asp Arg
275          65          70          75          80
276 Thr Lys Leu Val Thr Arg Ile Gln Thr Ala Val Lys Ser Val Ala Asn
277          85          90          95
278 Leu Glu Lys Asp Val Met Ala Gln Arg Gln Thr Ser Gln Asp Ile Asp
279          100          105          110
280 Leu Val Val Asp Ala Asn Ala Val Ala Tyr Asn Ser Ser Asp Val Phe
281          115          120          125
282 Ala Gln Lys Ala Gln Ala Phe Glu Gln Asp Arg Ala Arg Arg Ser Asn
283          130          135          140
284 Glu Glu Arg Gly Lys Lys Asp Ile Thr Ala Asp Val Leu Lys Gln Val
285          145          150          155          160
286 Lys

```

290 &lt;210&gt; SEQ ID NO: 10

291 &lt;211&gt; LENGTH: 161

292 &lt;212&gt; TYPE: PRT

293 &lt;213&gt; ORGANISM: Streptococcus typhi

RAW SEQUENCE LISTING ERROR SUMMARY  
PATENT APPLICATION: US/10/018,290A

DATE: 05/22/2002  
TIME: 13:47:34

Input Set : A:\DAVI149SEQLIST.TXT  
Output Set: N:\CRF3\05222002\J018290A.raw

Please Note:

Use of n and/or Xaa have been detected in the Sequence Listing. Please review the Sequence Listing to ensure that a corresponding explanation is presented in the <220> to <223> fields of each sequence which presents at least one n or Xaa.

Seq#:13; Xaa Pos. 197,198

10018290-047602

## VERIFICATION SUMMARY

DATE: 05/22/2002

PATENT APPLICATION: US/10/018,290A

TIME: 13:47:34

Input Set : A:\DAVI149SEQLIST.TXT

Output Set: N:\CRF3\05222002\J018290A.raw

L:15 M:271 C: Current Filing Date differs, Replaced Current Filing Date  
L:398 M:281 W: Numeric Fields not Ordered, <221> Sort in ascending order!  
L:402 M:258 W: Mandatory Feature missing, <220> not found for SEQ ID#:13  
L:427 M:341 W: (46) "n" or "Xaa" used, for SEQ ID#:13 after pos.:192

10018290-041502